

REMARKS

Claims 7-16, 18-26 and 30-34 are active. Claims 33-34 find support in original claim 7 and on page 20 of the specification. No new matter has been added. Favorable consideration of this amendment and allowance of this application is respectfully requested.

Rejection—35 U.S.C. §112, first paragraph

Claims 7-16, 18-26 and 30-32 were rejected under 35 U.S.C. 112, first paragraph, as lacking adequate written description. This rejection has been withdrawn—see the Advisory Action mailed May 17, 2007.

Rejection—35 U.S.C. §102

Claims 7-9, 11, 14, 15, 18, 22-24 and 30-32 were rejected under 35 U.S.C. 102(b) as being anticipated by Trost, U.S. Patent No. 4,051,157. Trost does not disclose all the elements of the invention and therefore cannot anticipate it.

Trost does not exemplify the invention, nor does it teach the invention with sufficient specificity to amount to anticipation. To anticipate an invention, the prior art must disclose the invention with sufficient specificity or permit one to immediately envisage it, see MPEP 2131.02(A).

Reference patent's generic formula encompasses a vast number and perhaps even an infinite number of compounds; even though applicants' claimed compounds are encompassed by this broad generic disclosure, disclosure by itself does not describe applicants' claimed invention within meaning of 35 U.S.C. 102(b). *In re Petering and Fall*, 133 USPQ 275; 301 F.2d 676 (CCPA 1962)

“[E]arlier disclosure of a genus does not necessarily prevent patenting a species member of that genus,” *Eli Lilly & Co. v. Bd of Regents of the Univ. of Washington*, 334 F.3d 1264, 1270 [67 USPQ2d 1161] (citing *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1380 [58 USPQ2d 1508] (Fed. Cir. 2001)).

Trost does not disclose oxygen nucleophiles having the specific structure required by the claims. That is, “. . . wherein the oxygen nucleophilic agent. . . is a compound containing an oxygen atom expressed by AO-H or its deprotonated form AO<sup>-</sup>. . .” Trost neither discloses nor suggests such a specific structure. While the Official Action asserts that Trost discloses that oxygen nucleophiles may be used, Trost provides nothing more than a general description that “the carbon nucleophiles can be replaced with oxygen or nitrogen nucleophiles”. Trost discloses a process which uses a vast, potentially unlimited number, of different carbon or oxygen nucleophiles, while the invention is directed to oxygen nucleophiles expressed by the formula AO-H or AO<sup>-</sup>. Moreover, with regard to the Examiner’s concern about water being an oxygen nucleophile, claims 33-34 exclude water.

Furthermore, Trost discloses a very broad genus of catalysts (“any trivalent phosphorous compound”, col. 3, lines 43-44). Like the situation in *Petering*, Trost discloses a vast number and potentially unlimited number of compounds. Trost indicates that any one of a phosphorus compound, a phosphine or a phosphite may be used, and that carbon nucleophiles and oxygen nucleophiles may be used equally. Trost does not disclose any specific combination of a phosphite and an oxygen nucleophilic agent. It discloses only a combination of a phosphine and a carbon nucleophilic agent in its Examples. On the other hand, the invention is directed to specific catalysts containing a monodentate phosphite containing of formula (I).

Accordingly, this anticipation rejection should be withdrawn since Trost does not disclose the structure of the oxygen nucleophilic agent required by the invention, nor does it exemplify the invention, nor does it teach the combination of a phosphate and an oxygen nucleophilic agent with sufficient specificity to anticipate the invention.

While Trost has not been applied under 35 U.S.C. §103, to expedite prosecution, the Applicants now address why Trost does not render the invention obvious.

(i) A characteristic feature of the invention resides in that in its ability to produce a desired second allyl compound using an oxygen nucleophilic agent having a specific structure. The problems solved by selecting a specific oxygen nucleophilic agent as well as a particular type of phosphate compound are disclosed on page 5, lines 14 to 25 of the specification. Trost does not disclose or suggest that such a remarkable effect can be developed by combination of these compounds. As recognized by the inventors, superior product yields are achieved using the oxygen nucleophiles of the invention in conjunction with the required phosphate-containing catalysts.

The prior art has attempted to solve this problem unsuccessfully. Thus, while it has been a goal and objective to those of skill in the art to improve the activity and selectivity of reactions, it was far from obvious how to do this, since the activity and selectivity of such reactions can fundamentally change depending on the type of phosphorous ligand used. Namely, even if it is known that some specific phosphorus ligand is capable of efficiently effectuating some reaction, it is difficult to predict that some other ligand would also do so. Variation in steric and electronic properties of phosphorous ligands make it difficult to predict the reactivity of phosphorous ligands.

(ii) On the other hand, many methods have been proposed to parameterize and categorize the characters of different phosphorous ligands. Among them, the parameters of phosphorus ligand of Tolman are well known to those skilled in the art--see Tolman, Chemical Reviews, 1977, Vol. 77, No. 3, pages 313-348 (previously attached).

Tolman discloses that as parameters for classifying phosphorus ligands,  $\Theta$  and  $\nu$  as parameters for steric effect and electronic effect, respectively, are very useful. Namely, ligands showing similar values in both of  $\Theta$  and  $\nu$  show similar reactivities. Further, if the  $\Theta$  and  $\nu$  parameters of two ligands are different, these ligands would show different reactivities.

For example, even if some phosphorus ligand having a large steric hindrance (i.e., where  $\Theta$  is large) and a large electron donative property (where  $\nu$  is small) is suitable for some reaction, some other reaction may require as a suitable ligand a phosphorous ligand having a large steric hindrance ( $\Theta$  is large) and small electron donative property ( $\nu$  is large). Further, in such a reaction, it cannot be said that the larger the value  $\Theta$  is, the better. In some cases, a phosphorous ligand having  $\Theta$  within an optimum range is preferred.

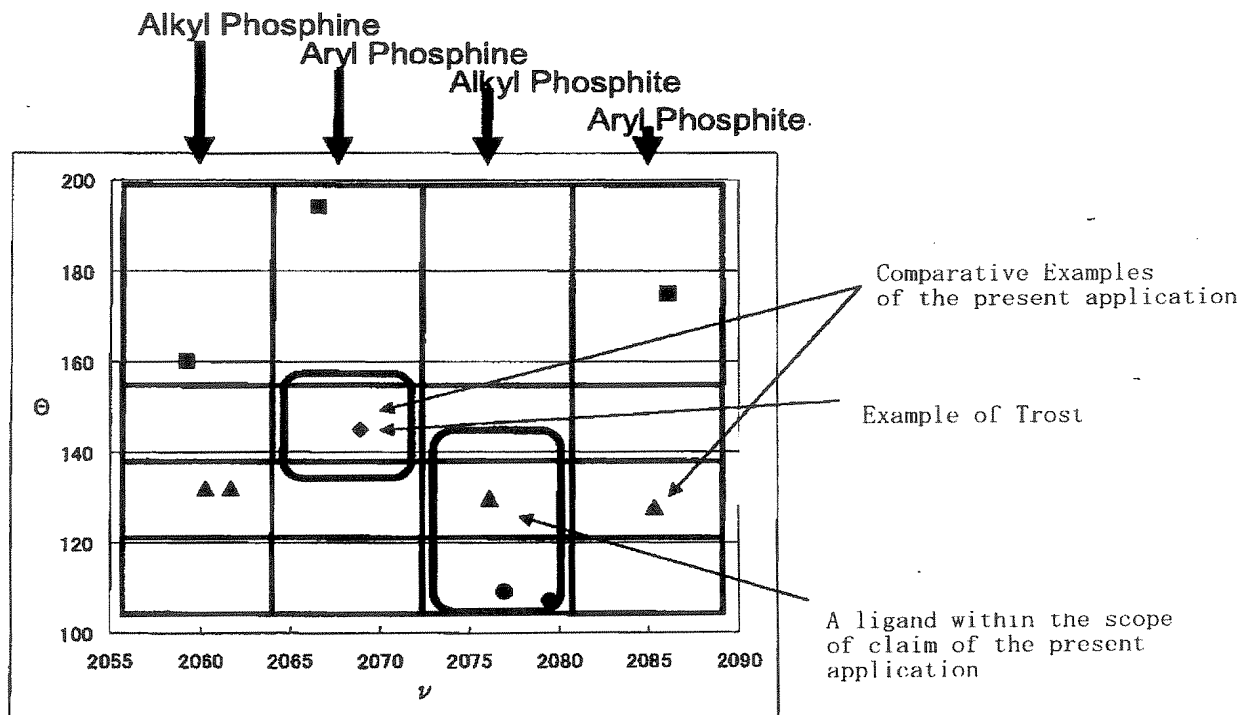
Namely, the optimum combination of  $\Theta$  and  $\nu$  values depends on the reactions, and it is difficult to predict that some phosphorous ligand with specific  $\Theta$  and  $\nu$  values excellent for some reaction may suitably be used for other reactions.

(iii) As depicted below, the steric and electron structures of phosphorous ligands described in Trost are different from the steric and electron structures of the phosphorous ligand of the present invention. In the following Table 1, the  $\Theta$  and  $\nu$  values of the phosphorous ligand indicated in Appendixes A and B of Tolman are summarized.

Table 1

	$\nu$	$\Theta$
PiPr <sub>3</sub>	2059.2	160
Pbu <sub>3</sub>	2060.3	132
Pet <sub>3</sub>	2061.7	132
P(o-Tol) <sub>3</sub>	2066.6	194
PPh <sub>3</sub>	2068.9	145
P(OiPr) <sub>3</sub>	2076.1	130
P(OEt) <sub>3</sub>	2077	109
P(Ome) <sub>3</sub>	2079.5	107
P(OPh) <sub>3</sub>	2085.3	128
P(O-o-C <sub>6</sub> H <sub>4</sub> -t-Bu) <sub>3</sub>	2086.1	175

Further, in the following Fig. 1, the  $\Theta$  and  $\nu$  values of respective ligands are plotted. To simplify this explanation, the  $\Theta$  and  $\nu$  values are classified into four ranges (columns), respectively, and into 16 areas as shown in the following graph (Fig. 1):



(iv) The  $\nu$  value indicates the electronic effect and shows that the larger the value is, the more electron donative the phosphorous ligand is. Further, the four ranges (columns) of the  $\nu$  value in the above graph correspond to “alkylphosphine”, “aryl phosphine”, “alkyl phosphite” and “aryl phosphite” in order from small value to large value. The  $\Theta$  value indicates the steric effect and shows that the smaller the value is, the smaller the steric hindrance of the phosphorous ligand is. This  $\Theta$  value depends on the steric structure of a phosphorous substituent.

Trost describes that in addition to  $\text{PPh}_3$ , alkyl phosphine and alkyl phosphite may be used, but does not exemplify such. As is apparent from the above graph,  $\text{PPh}_3$  is an aryl phosphine having different reactivity parameters (e.g., belonging to area in the above graph) than the areas in which alkyl phosphine and alkyl phosphite fall. Namely, based on the

above, that the alkyl phosphine and alkyl phosphite would show a different reactivity from  $\text{PPh}_3$ .

Further, the Trost ligand is effective for both carbon nucleophiles and oxygen nucleophiles. However, Trost describes only the reaction with carbon nucleophiles in the Examples. Namely, in Trost, based on the Example of the reaction with a carbon nucleophile using an aryl phosphine as a ligand, it is described that Trost's invention is effective for a different reaction using another phosphorous ligand (reaction with an oxygen nucleophile). However, as mentioned above, it is difficult to predict the reactivity of a different reaction using a phosphorous ligand having a parameter which belongs to different area, see Fig. 1 above.

(v) As exemplified in the specification, when  $\text{PPh}_3$  as an aryl phosphine (Comparative Example 5) and  $\text{P(OPh)}_3$  (Comparative Example 6) as an aryl phosphite are used, the reaction with an oxygen nucleophilic agent does not efficiently proceed. On the other hand, when  $\text{P(OiPr)}_3$  (Example 3) as an alkyl phosphite which falls within the scope of claim of the present invention is used, excellent reactivity is seen. Accordingly, the inventors have found an optimum area for the reaction with an oxygen nucleophilic agent which is not disclosed or suggested by the prior art. This discovery clearly represents an inventive step (is indicative of non-obviousness) of the claimed invention.

	Ligand	Oxygen nucleophilic agent	Yield of the second allyl compound
Example 3	Triisopropyl phosphite	1-Octanol	38%
Comparative Example 5	Triphenyl phosphine	1-Octanol	7%
Comparative Example 6	Triphenyl phosphite	1-Octanol	3%

As is evident from the above Table, the yield of the desired second allyl compound is very low when an oxygen nucleophilic agent and a phosphine compound are combined. Even when an oxygen nucleophilic agent is combined with a phosphite compound unlike

those required by the invention (a triphenyl phosphate that does not have the required straight or branched alkyl group, e.g., triphenyl phosphite), the yield of the secondary allyl compound is very low (e.g. 3% for triphenyl phosphate).

As mentioned above, Trost neither discloses nor suggests that the catalyst having a high activity can be obtained by selecting an oxygen nucleophilic agent having a specific structure and a phosphite compound having a specific structure.

(vi) Claim 7 is novel and unobvious for the reasons above, thus, Claims 8-16, 18-26 and 30-32 are also novel and unobvious.

In view of the remarks above, the Applicants respectfully request that the rejection based on Trost be withdrawn.

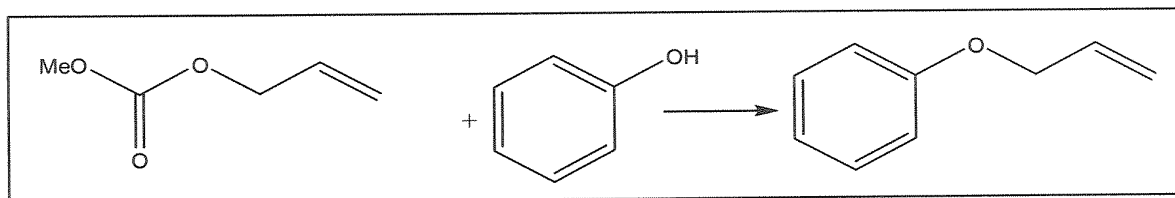
#### Rejection—35 U.S.C. §103

Claims 7-16, 18-26 and 30-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kurtz et al., U.S. Patent No. 3,755,451, in view of Bryant, U.S. Patent No. 3,534,088 or Hefner, Jr., U.S. Patent No. 4,613,703. The prior art does not suggest or provide a reasonable expectation of success for the invention for the reasons previously discussed, none of which suggests or provide a reasonable expectation of success for the present method involving selected oxygen nucleophilic agents and selected phosphate catalysts.

Commensurate in Scope. The Official Action asserts that the showing in Tables 1 and 2 of the specification are not commensurate in scope with the protection sought, but does not explain why these results are deemed not commensurate or what the Office might consider commensurate in scope with the present claims. Nevertheless, the Applicants now provide additional experimental data showing the superior results obtained by the claimed process.

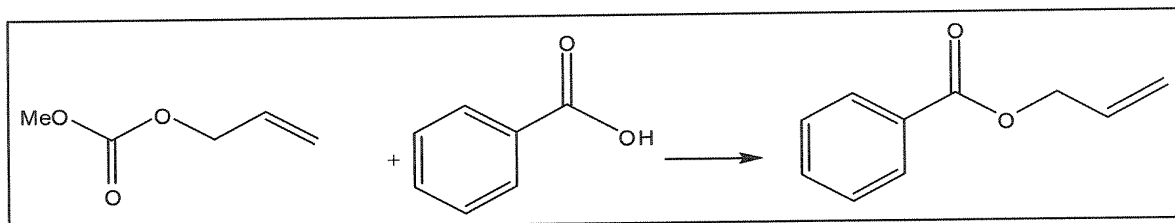
The Examples in the specification show the comparative yields obtained when triisopropyl phosphite and triethyl phosphite were used as the monodentate phosphite. The effects of varying the alkyl chain length in the compound of formula (I) on yield of allyl products are shown in the specification and by the experimental data below.

The experimental data in the following section refer to the following chemical reaction which produces allyl phenyl ether.



Formula (I) compound		Yield (allyl phenyl ether)
Triisopropyl phosphite	Example 1	<b>97%</b>
Triethyl phosphite	Example 2	<b>50</b>
Tributyl phosphite	Declaration	<b>66</b>
Tris (2-ethylhexyl) phosphite	Declaration	<b>58</b>
Triisodecyl phosphite	Declaration	<b>45</b>
Triphenyl phosphite	Comp. Ex. 2	3
Tris (2,4-di-t-butylphenyl) phosphite	Comp. Ex. 3	0
DPPB (bidentate phosphine)	Comp. Ex. 1	4

The experimental data in the next section refer to the following chemical reaction which produces allyl benzoate.



Formula (I) compound		Yield (allyl benzoate)
Triisopropyl phosphite	Example 4	<b>60%</b>
Tributyl phosphite	Declaration	<b>59</b>
Tris (2-ethylhexyl) phosphite	Declaration	<b>65</b>
Triisodecyl phosphite	Declaration	<b>54</b>



Triphenyl phosphite	Comp. Ex. 9	21
DPPB (bidentate phosphine)	Comp. Ex. 8	1

As shown above, selection of the particular catalysts and reactants required by the claimed process provides superior product yields,.

A characteristic feature of the present invention resides involves the selection of an oxygen nucleophilic agent having a specific structure and a phosphite compound having a specific structure. For example, unlike prior art processes, the invention does not employ phosphites having substituents like phenyl. However, the results above show that selection of linear or branched alkyl substituents provide superior yields. The prior art does not suggest selection of such compounds, nor does it provide a reasonable expectation of success for the superior properties of a process selecting these particular types of compounds.

(ii) Moreover, as described by Tolman, even if a longer alkyl group substituent in the phosphorous ligand is used, the parameter of the ligand will not be substantially changed. For example, in comparison between  $\text{PEt}_3$  and  $\text{PBu}_3$ , the  $\nu$  values are 2061.7 and 2060.3, respectively, and the  $\Theta$  values are 132 in both cases. Further, in comparison between  $\text{P(OMe)}_3$  and  $\text{P(OEt)}_3$ , the  $\nu$  values are 2079.5 and 2077.0, respectively, and the  $\Theta$  values are 107 and 109, respectively. Thus, even if the length of the alkyl group substituent in the phosphorous ligand were extended, these values would remain within the same area as shown by the Fig. 1 above. Thus, other alkyl substituents for the R groups in formula (1) of Claim 7, would be expected to provide phosphites with similar functional properties.

Based on the above, including the exemplified reactions involving  $\text{P(OEt)}_3$  and  $\text{P(OiPr)}_3$ , one with ordinary skill in the art would not any reason to doubt that phosphites having longer alkyl chains, such as  $\text{P(Obu)}_3$ ,  $\text{P(OOctyl)}_3$  and  $\text{P(OctBu)}_3$ , would not effectively function in the claimed method. Moreover, the Office has not rebutted the experimental data and technical analysis above.

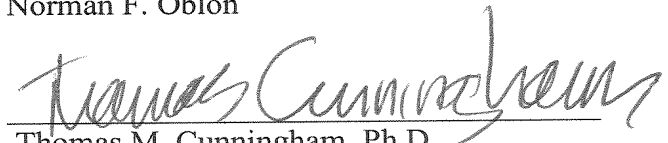
In view of the experimental data of record and the new data shown above, the Applicants respectfully submit that the superior properties of the present invention compared with the prior art have been adequately demonstrated. Accordingly, the Applicants respectfully request that this rejection be withdrawn.

Conclusion

This application presents allowable subject matter and the Examiner is respectfully requested to pass it to issue. The Examiner is kindly invited to contact the undersigned should a further discussion of the issues or claims be helpful.

Respectfully submitted,

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